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CANADA

EXAMINER	
BOWERS, NATHAN ANDREW	
ART UNIT	**PAPER NUMBER**
1744	

DATE MAILED: 04/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/687,761	SHAREEFDEEN ET AL.
	Examiner	Art Unit
	Nathan A. Bowers	1744

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 March 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *031405, 102804*. , 062404

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Claims 22-25 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 10 March 2006.

Claim Objections

Claim 21 is objected to because of the following informalities: the claim recites "a biofilter system according to claim 18...," however claim 18 does not disclose a "biofilter system." It is believed that claim 21 should be dependent upon claim 20, rather than claim 18. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1) Claims 1-6, 9, 11, 13, 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over the English translation of Fattinger (EP 0497214 A1) in view of Blowes (US 5876606).

With respect to claims 1 and 4-6, Fattinger discloses a biofilter media comprising a plurality of grains. Page 2 indicates that each grain comprises a porous hydrophilic

nucleus that is surrounded by a hydrophobic coating. The hydrophobic coating comprises microorganisms, nutrients, organic carbon, an alkaline buffer, a bonding agent, an adsorptive agent and a hydrophobic agent. Page 2 teaches that an activated carbon and an adsorptive resin are applied as the means for coating the surface of the nucleus, and that microorganisms are deposited upon the surface of the nucleus. Page 3 teaches the use of a bonding agent, as well as an alkaline buffer system utilizing carbonates. Fattinger discloses that it is advantageous to provide the grains with material that is suitable as a nutritive substratum for the microorganisms. Fattinger also indicates that the coating includes compost, peat, and a layer of activated carbon. Fattinger, however, does not expressly disclose that the hydrophobic coating includes a metallic agent.

Blowes discloses a method of purifying a contaminated water stream that utilizes a permeable treatment filter. Column 2, line 49 to column 3, line 11 indicate that the filter comprises a plurality of grains that are coated with powder-fine particles of iron oxide. Blowes indicates that the metal oxides are useful in stripping phosphates from the contaminated water stream.

Fattinger and Blowes are analogous art because they are from the same field of endeavor regarding filters for fluid treatment processes.

At the time of the invention, it would have been obvious to add a metallic agent to the hydrophobic coating disclosed by Fattinger. Blowes teaches in column 2, line 49 to column 3, line 11 that it is possible to coat metal powders onto filter media grains, and that the metal powders are effective in removing contaminants such as phosphates. In

column 5, lines 27-32, Blowes indicates that the metal-coated grains are capable of being incorporated into biofilters, as well as a variety of other treatment systems. The iron powder coating disclosed by Blowes would be beneficial if used in the invention disclosed by Fattinger since the iron particles remove contaminants by precipitating them onto the surface of the grain. In this way, the metal coating layer works to remove contaminants that are not eliminated by microbial degradation.

With respect to claims 2 and 3, Fattinger and Blowes disclose the apparatus set forth in claim 1 as set forth in the 35 U.S.C. 103 rejection above. Additionally, Fattinger indicates on page 2 that the hydrophilic nucleus is made from a porous substance such as gas-aerated concrete, swelling clay, or pumice. All of these granular compounds are porous, low-density aggregates. Gas-aerated concrete in particular represents an aggregate that could intrinsically be produced by gas expansion at temperatures exceeding 1,100 degrees Celsius. This is due to the fact that gas-aerated concrete is formed when gases expand within the aggregate, and thereby make the aggregate more porous.

With respect to claims 9 and 13, Fattinger and Blowes disclose the apparatus set forth in claim 1 as set forth in the 35 U.S.C. 103 rejection above. In addition, Fattinger teaches on page 2 that activated sludge from a wastewater treatment plant is added with the microorganisms to the biofilter media during inoculation. The activated sludge

comprises microorganisms and acts as a nutrient source since microorganisms are known in the art to metabolize sludge.

With respect to claim 11, Fattinger and Blowes disclose the apparatus set forth in claim 1 as set forth in the 35 U.S.C. 103 rejection above. Fattinger further indicates on page 3 that nutrients and organic carbon are provided by compost and peat.

With respect to claim 16, Fattinger and Blowes disclose the apparatus set forth in claim 1 as set forth in the 35 U.S.C. 103 rejection above. In addition, Fattinger discloses the use of calcium and magnesium carbonates as alkaline buffers.

With respect to claim 17, Fattinger and Blowes disclose the apparatus set forth in claim 1 as set forth in the 35 U.S.C. 103 rejection above. Furthermore, Fattinger states on page 2 that the grains have a size of approximately 2 to 8 mm.

2) Claims 10, 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over the English translation of Fattinger (EP 0497214 A1) in view of Blowes (US 5876606) as applied to claims 1 and 9, and further in view of Maddux (US 20020170858).

With respect to claim 10, Fattinger and Blowes disclose the biofilter media set forth in claim 1 as set forth in the 35 U.S.C. 103 rejection above, however do not

expressly disclose the particular types of microorganisms that positioned upon the grains.

Maddux discloses a biofiltration system comprising a plurality of bio-media balls (Figure 4:80) that are packed into a housing. Water is passed through the housing and over the bio-media balls in order to remove contaminants. Bacteria, such as *Thiobacillus ferroxidants*, are immobilized upon the bio-media balls in order to facilitate the degradation of contaminants. This is disclosed in paragraphs [0028]-[0033].

Fattinger, Blowes and Maddux are analogous art because they are from the same field of endeavor regarding filters for fluid treatment processes.

At the time of the invention, it would have been obvious to utilize bacteria, such as *Thiobacillus ferroxidants*, in the biofiltration medium disclosed by Fattinger and Blowes. Maddux teaches that *Thiobacillus ferroxidants* is useful in removing iron contaminants from a fluid stream, and that *T. ferroxidants* is capable of being cultured with a variety of other bacteria to form a heterogeneous culture. Most importantly, *T. ferroxidants* can be used to transform ferrous iron to ferric iron. Ferric iron readily combines with carbonate and sulfur contaminants to form precipitates which can be settled. In general, bacteria of the *Thiobacillus* genus are beneficial to air purifying systems because they are used to transform sulfides to a more manageable form.

With respect to claims 14 and 15, Fattinger and Blowes disclose the biofilter media set forth in claim 9 as set forth in the 35 U.S.C. 103 rejection above, however do

not expressly disclose that the bacteria used in the biofilter medium are derived from a standard laboratory growth medium.

Maddux discloses the invention as previously described. In addition, Maddux states in paragraph [0045] that bacteria is cultured in a typical laboratory setting before it is applied to the biofiltration medium. Agar and broth are known in the art as standard laboratory bacterial growth materials.

At the time of the invention, it would have been obvious to culture the bacteria disclosed by Fattinger in a standard laboratory growth medium such as agar or broth before moving the bacteria to the biofiltration apparatus. Agar and broth are known in the art to adequately provide for bacteria nutrient requirements. By culturing the bacteria in a laboratory setting, one would be able to grow the strains in a desired way, and ensure that the bacteria conditioned for a desired task. Agar and broth represent a viable and effective alternative growing medium to the wastewater system disclosed by Fattinger.

3) Claims 7, 8 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over the English translation of Fattinger (EP 0497214 A1) in view of Blowes (US 5876606) as applied to claim 1, and further in view of Saha (US 6291233).

With respect to claims 7 and 8, Fattinger and Blowes disclose the apparatus as previously described. Fattinger indicates on pages 2 and 3 that activated carbon is incorporated into the granular biofiltration medium as a hydrophobic and adsorptive

agent. Fattinger does not disclose, however, that the adsorptive agent further comprises clinoptilolite.

Saha discloses an air cleaning system that utilizes a biofilter (Figure 1:3) for removing pollutants. The biofilter is packed with sorbents and bio-solids which capture airborne contaminants and subsequently degrade them. This is disclosed in column 2, lines 15-52 and column 4, lines 13-30. Table 1 indicates that clinoptilolite is utilized in the apparatus as a particularly useful adsorptive agent.

Fattinger, Blowes and Saha are analogous art because they are from the same field of endeavor regarding biofiltration systems.

At the time of the invention, it would have been obvious to utilize clinoptilolite in the biofilter medium disclosed by Fattinger and Blowes as an adsorptive agent. In Table 1, Saha teaches that clinoptilolite is capable of adsorbing light volatile organic compounds and hydrocarbons, and removing ammonia and heavy metals present in fluid streams. Clinoptilolite aids in microbial growth and bio-oxidation, and is further useful because it increases bed porosity.

With respect to claim 12, Fattinger and Blowes disclose the apparatus as previously described, however do not expressly disclose that the nutrients used in the creation of the hydrophobic coating include phosphorus, nitrogen and potassium.

Saha discloses the apparatus as previously described. Saha further teaches that microorganisms immobilized within the biofilter are supplied with a steady stream of nutrients since the microorganisms are able to metabolize contaminants from

wastewater and waste air. In column 2, lines 53-65 Saha indicates that the microorganisms are provided with nitrogen, phosphorus and potassium in this way.

At the time of the invention, it would have been obvious to ensure that the nutrients provided by the hydrophobic coating disclosed by Fattinger and Blowes included phosphorus, nitrogen and potassium. In column 2, lines 53-65 Saha teaches that phosphorus, nitrogen and potassium are useful nutrients that are necessary during bioxidation and metabolization processes that convert contaminants to carbon dioxide and water. Phosphorus, nitrogen and potassium are known in the art as elements necessary for microorganism growth.

4) Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over the English translation of Fattinger (EP 0497214 A1) in view of Blowes (US 5876606) as applied to claim 1, and further in view of Mullerheim (US 5837142).

Fattinger and Blowes disclose the apparatus set forth in claim 1 as set forth in the 35 U.S.C. 103 rejection above. However, if calcium carbonate cannot be considered as a similar alkaline material to silicates and fly ash, then Fattinger and Blowes do not anticipate every limitation in claim 16.

Mullerheim discloses an apparatus for treating wastewater using membrane filtration. In column 12, line 60 to column 13, line 9, Mullerheim discloses the use of fly ash as a buffering agent.

Fattinger, Blowes and Mullerheim are analogous art because they are from the same field of endeavor regarding waste treatment processes.

At the time of the invention, it would have been obvious to incorporate fly ash into the hydrophobic coating disclosed by Fattinger and Blowes as the alkaline buffer. Since fly ash is a common industrial byproduct, it would have been easily attainable, and would have offered a viable and effective alternative to the alkaline buffers disclosed by Fattinger. Since fly ash is a waste product, its constructive use as a buffer in the hydrophobic coating would have been especially beneficial.

5) Claims 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over the English translation of Fattinger (EP 0497214 A1) in view of Blowes (US 5876606) and Ferranti (US 6358729).

With respect to claims 18 and 19, Fattinger and Blowes disclose the apparatus set forth in claim 1 as set forth in the 35 U.S.C. 103 rejection above, however do not expressly disclose that the biofilter media is operable to remove hydrogen sulfide at range of pH levels from approximately 2 to approximately 7.

Ferranti disclose a biofilter system that utilizes the biofilter media disclosed by Fattinger in order to strip pollutants from contaminated air. This is disclosed in column 3, line 42 to column 5, line 2. Ferranti further indicates in column 2, lines 30-36 and column 3, line 66 to column 4, line 3 that the pH of the system is adjusted to slightly acidic conditions in order to better facilitate the removal of pollutants. The exact pH value is taught to be determined as a function of the polluting substance on a case-by-case basis. In column 5, lines 25-29, Ferranti further indicates that the biofiltration system is capable of removing hydrogen sulfide from the air. The required time to do

this is dependent on the initial amount of contaminants present, the airflow rate through the filter, as well as a number of other variables, and could intrinsically be accomplished within 24 hours under enabling circumstances.

Fattinger, Blowes and Ferranti are analogous art because they are from the same field of endeavor regarding fluid treatment filtration processes.

At the time of the invention, it would have been obvious to use the biofilter media disclosed by Fattinger and Blowes to remove hydrogen sulfide from an air stream. Ferranti recommends that the disclosed biofilter media be used this way in column 3, line 42 to column 5, line 2 and column 5, lines 25-29. Since hydrogen sulfide is a common air pollutant that has a displeasing smell, it would have been obvious to use Fattinger and Blowes's biofilter to remove it from an air stream.

With respect to claims 20 and 21, Fattinger and Blowes disclose the apparatuses previously described. Fattinger discloses a biofilter media comprising a porous hydrophilic nucleus and a hydrophobic coating. Blowes discloses a biofilter media that includes a plurality of grains coated with a metallic agent. Fattinger and Blowes do not disclose a system in which the disclosed biofilter media is used to treat contaminated air.

Ferranti discloses a biofilter system comprising a housing, an inlet for receiving contaminated air, and an outlet for exhausting cleaned air. A biofilter media (Figure 1:34) is situated between the inlet and outlet, and works to remove contaminants from

the air stream. The biofilter system is further provided with a water delivery system. This is disclosed in column 3, line 42 to column 5, line 2.

At the time of the invention, it would have been obvious to use the filter medium proposed by Fattinger and Blowes in the air purification system disclosed by Ferranti. Ferranti specifically states in column 4, lines 20-29 that the filtration medium disclosed by Fattinger is well suited for use in the disclosed biofilter system as an air purifying substance. Ferranti additionally states that the purifying ability of the filtering medium disclosed by Fattinger is increased when incorporated into a system that includes an established housing, fluid delivery system and control system.

6) Claims 1-5, 9-11 and 13-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over the English translation of Fattinger (EP 0497214 A1) in view of Maddux (US 20020170858).

With respect to claims 1, 4 and 5, Fattinger discloses the apparatus as previously described. In summary, Fattinger discloses a biofilter media comprising a plurality of grains. Each grain includes a porous hydrophilic nucleus and a hydrophobic coating. The hydrophobic coating comprises microorganisms, nutrients, organic carbon, an alkaline buffer, a bonding agent, an adsorptive agent and a hydrophobic agent. Fattinger, however, does not expressly disclose that the hydrophobic coating also includes a metallic agent.

Maddux discloses a biofiltration system comprising a plurality of bio-media balls (Figure 4:80) that are packed into a housing. Water is passed through the housing and

over the bio-media balls in order to remove contaminants, and bacteria are immobilized upon the bio-media balls in order to facilitate the degradation of contaminants. This is disclosed in paragraphs [0028]-[0033]. In paragraphs [0009], [0008] and [0041], Maddux discloses that the bio-media balls become coated with metal oxides during filtration because the iron in the contaminated stream is converted from a ferrous state to a ferric state by the bacteria. The ferric iron readily combines with carbonates and sulfur in the stream, and subsequently precipitates on the bio-media balls. See paragraph [0030]. More importantly, paragraph [0041] also states that the bio-media balls are pre-coated with metal oxides before biofiltration.

Fattinger and Maddux are analogous art because they are from the same field of endeavor regarding filters for fluid treatment processes.

At the time of the invention, it would have been obvious to add a metallic agent to the hydrophobic coating disclosed by Fattinger. Maddux teaches in paragraph [0041] that it is possible to coat metal oxides onto filter media grains, and that the presence of metal oxides are capable of "expediting the effectiveness" of the biofiltration apparatus. In this way, the removal of iron and sulfate contaminants from the filtered waste stream is encouraged.

With respect to claims 2 and 3, Fattinger and Maddux disclose the apparatus set forth in claim 1 as set forth in the 35 U.S.C. 103 rejection above. Additionally, Fattinger indicates on page 2 that the hydrophilic nucleus is made from a porous substance such as gas-aerated concrete, swelling clay, or pumice. All of these granular compounds are

porous, low-density aggregates. Gas-aerated concrete in particular represents an aggregate that could intrinsically be produced by gas expansion at temperatures exceeding 1,100 degrees Celsius. This is due to the fact that gas-aerated concrete is formed when gases expand within the aggregate, and thereby make the aggregate more porous.

With respect to claims 9 and 13, Fattinger and Maddux disclose the apparatus set forth in claim 1 as set forth in the 35 U.S.C. 103 rejection above. In addition, Fattinger teaches on page 2 that activated sludge from a wastewater treatment plant is added with the microorganisms to the biofilter media during inoculation. The activated sludge comprises microorganisms and acts as a nutrient source since microorganisms are known in the art to metabolize sludge.

With respect to claim 10, Fattinger and Maddux disclose the apparatus set forth in claim 1 as set forth in the 35 U.S.C. 103 rejection above. In addition, Maddux discloses that bacteria such as *Thiobacillus ferroxidants* are immobilized upon the bio-media balls in order to facilitate the degradation of contaminants. This is disclosed in paragraphs [0028]-[0033].At the time of the invention, it would have been obvious to utilize bacteria, such as *Thiobacillus ferroxidants*, in the biofiltration medium disclosed by Fattinger. Maddux teaches that *Thiobacillus ferroxidants* is useful in removing iron contaminants from a fluid stream, and that *T. ferroxidants* is capable of being cultured with a variety of other bacteria to form a heterogeneous culture. Most importantly, *T.*

ferroxidants can be used to transform ferrous iron to ferric iron. Ferric iron readily combines with carbonate and sulfur contaminants to form precipitates which can be settled. In general, bacteria of the *Thiobacillus* genus are beneficial to air purifying systems because they are used to transform sulfides to a more manageable form.

With respect to claim 11, Fattinger and Maddux disclose the apparatus set forth in claim 1 as set forth in the 35 U.S.C. 103 rejection above. Fattinger further indicates on page 3 that nutrients and organic carbon are provided by compost and peat.

With respect to claims 14 and 15, Fattinger and Maddux disclose the biofilter media set forth in claim 9 as set forth in the 35 U.S.C. 103 rejection above. Maddux additionally states in paragraph [0045] that it is known in the art to culture bacteria in a laboratory setting before it is applied to the biofiltration medium. Agar and broth are known in the art as standard laboratory bacterial growth materials.

At the time of the invention, it would have been obvious to culture the bacteria disclosed by Fattinger in a standard laboratory growth medium such as agar or broth before moving the bacteria to the biofiltration apparatus. Agar and broth are known in the art to adequately provide for bacteria nutrient requirements. By culturing the bacteria in a laboratory setting, one would be able to grow the strains in a desired way, and ensure that the bacteria conditioned for a desired task. Agar and broth represent a viable and effective alternative growing medium to the wastewater system disclosed by Fattinger.

With respect to claim 16, Fattinger and Maddux disclose the apparatus set forth in claim 1 as set forth in the 35 U.S.C. 103 rejection above. In addition, Fattinger discloses the use of calcium and magnesium carbonates as alkaline buffers.

With respect to claim 17, Fattinger and Maddux disclose the apparatus set forth in claim 1 as set forth in the 35 U.S.C. 103 rejection above. Furthermore, Fattinger states on page 2 that the grains have a size of approximately 2 to 8 mm.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan A. Bowers whose telephone number is (571) 272-8613. The examiner can normally be reached on Monday-Friday 8 AM to 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gladys Corcoran can be reached on (571) 272-1214. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

NAB

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